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# FIELDIANA

## Botany

Published by Field Museum of Natural History

New Series, No. 7

### FLORA OF PERU

J. FRANCIS MACBRIDE  
AND COLLABORATORS

#### FAMILY COMPOSITAE: PART II

#### TRIBE ANTHEMIDEAE

MICHAEL O. DILLON

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MICHAEL O. DILLON

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*Department of Botany*

*Field Museum of Natural History*

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## Tribe ANTHEMIDEAE<sup>1</sup>

**Anthemideae** Cass., J. Phys. Chim. Hist. Nat. Arts 88: 192. 1819. TYPE: *Anthemis* L.

*Anthemidaceae* Link, Handbuch 1: 752. 1929.

Perennial to annual **herbs**, or more rarely **shrubs** or **subshrubs**, often aromatic. **Leaves** mostly alternate, rarely opposite, often dissected, lobed or toothed. **Inflorescences** corymbose, racemose, paniculate, or solitary. **Capitula** usually heterogamous, radiate or disciform, rarely homogamous, discoid; involucre cylindrical to globose; phyllaries 1–4-seriate, imbricate, wholly scarious or herbaceous with scarious margins and apices; receptacles flat to convex or convex-conical, naked or rarely pubescent or with persistent or deciduous paleae; marginal florets usually pistillate, the corollas ligulate or rarely absent, homochromatic white, yellow, or red (occasionally pink) to heterochromatic white or cream distally and yellow proximally, entire or 1–3-denticulate; disc florets hermaphroditic or functionally male, the corollas tubular to funnelform, 4–5-merous (rarely 3-merous), usually homochromatic yellow to occasionally deep red, the anthers basally obtuse or short-tailed, the terminal appendages deltoid to ovate, acute to rounded, the style branches truncate, terminally penicillate with the stigmatic surfaces in two, parallel, marginal stripes. **Achenes** di- or isomorphic, 2–10-ribbed or 1–3-winged, circular or angled-terete to strongly dorsiventrally or laterally compressed; pappus coroniform or occasionally absent.

The Anthemideae is a large tribe consisting of some 101 genera and about 1,400 species (Heywood & Humphries, 1977), occurring primarily in the temperate Northern Hemisphere. In Peru, many species are introduced weeds or escapees from cultivation; however, various members of *Cotula*, *Soliva*, and *Plagiocheilus* are considered native to South America.

## REFERENCE

HEYWOOD, V. H., AND C. J. HUMPHRIES. 1977. Anthemideae—Systematic review. In Heywood, V. H., et al. (eds.), *The Biology and Chemistry of the Compositae*, pp. 852–898. Academic Press, London.

## KEY TO GENERA OF ANTHEMIDEAE

1. Receptacles conspicuously paleaceous<sup>2</sup> ..... 2.
2. Capitula discoid or disciform; outer florets with corollas regularly 5-lobed, yellow ..... IX. *Santolina*.
2. Capitula radiate; outer florets with corollas ligulate, white, yellow or pinkish ..... I. *Achillea*.
1. Receptacles epaleaceous (rudimentary paleae present in *Tanacetum parthenium*) .... 3.

<sup>1</sup>Assisted by National Science Foundation Grant DEB-79-05078 (Alwyn H. Gentry, principal investigator).

<sup>2</sup>Cultivars of *Dendranthema morifolium* often possess capitula lacking disc florets and having a proliferation of pistillate, ray florets, each subtended by a palea similar to an inner phyllary.

3. Capitula radiate; outer florets with corollas ligulate and exceeding the disc . . . . 4.
4. Leaves pinnatifid . . . . . 5.
5. Involucres ca. 5 mm wide; receptacles conical and elongating with age . . . . VII. *Matricaria*.
5. Involucres 10–20 mm wide; receptacles convex to planar . . . . . 6.
6. Achenes isomorphic, cylindrical or clavate, 3–10-ribbed . . XI. *Tanacetum*.
6. Achenes dimorphic, the outer 3-angled, the inner cylindrical or subcylindrical . . . . . III. *Chrysanthemum*.
4. Leaves entire, dentate or deeply lobed, never pinnatifid . . . . . 7.
7. Capitula usually solitary; ray florets uniseriate. . . . . VI. *Leucanthemum*.
7. Capitula in lax corymbs; ray florets multiseriate. . . . . V. *Dendranthema*.
3. Capitula discoid or disciform; outer florets with corollas tubular, variously lobed or bilabiate (absent in *Cotula*), never conspicuously radiate . . . . . 8.
8. Outer or marginal florets with corollas bilabiate . . . . . VIII. *Plagiocheilus*.
8. Outer or marginal florets with corollas tubular or filiform, regularly 3–5-lobed (absent in *Cotula*) . . . . . 9.
9. Corollas of the disc florets regularly 5-dentate . . . . . 10.
10. Inflorescences compact spikes or panicles; capitula pendent II. *Artemisia*.
10. Inflorescences corymbose; capitula erect . . . . XI. *Tanacetum* (*T. vulgare*).
9. Corollas of the disc florets 3–4-lobed . . . . . 11.
11. Capitula sessile in leaf clusters. . . . . X. *Soliva*.
11. Capitula pedunculate . . . . . IV. *Cotula*.

## I. ACHILLEA

**Achillea** L., Sp. Pl. 899. 1753. TYPE: *A. millefolium* L.

Perennial herbs. Leaves alternate, 3–4-pinnatifid to entire. Inflorescences corymbose or corymbiform-paniculate, rarely solitary, terminal. Capitula radiate, heterogamous, subsessile or pedunculate; involucre oblong-cylindrical, ovoid, hemispherical, or depressed; phyllaries 3–4-seriate, graduate, the margins scarious; receptacles conic or convex; paleae lanceolate or oblong, membranaceous; ray florets 2–15, pistillate, fertile, the ligules 3-dentate, white, yellow, or sometimes pinkish; disc florets 8–100, hermaphroditic, fertile, the corollas tubular, subcompressed, the bases pouched and enveloping tops of achenes, 5-lobed distally, white, yellow, or pink, the anthers basally obtuse, the terminal appendages ovate, the style branches truncate, penicillate. Achenes oblong or obovate, compressed, glabrous, smooth; pappus absent.

A genus of some 85 species from southeastern Europe and southwestern and central Asia. It is represented throughout Central and South America by the following cultivated and frequently escaping species.

1. **Achillea millefolium** L., Sp. Pl. 899. 1753. TYPE: Europe, exact locality and collector unknown (LINN, holotype, not seen, IDC Microfiche 117. 609: II. 7).

Aromatic, perennial herbs from creeping rootstocks, to 0.5 m tall; stems erect, simple or branched, woolly-pilose. Leaves oblanceolate to oblong in outline, 2–3-pinnatifid, 4–10 cm long, 0.5–1.5 cm wide, the ultimate segments linear to linear-lanceolate, 1–2 mm long, ca. 1 mm wide, spinulose-tipped, loosely pilose. Inflorescences corymbiform-paniculate, 50–100-flowered; peduncles 1–5 mm long. Capitula 4–5 mm high, 2–3 mm wide (excluding rays); involucre oblong to ovoid; phyllaries 4-seriate, the outer ovate, 1.5–2.0 mm long, ca. 1 mm wide, sparsely woolly-pilose to subglabrous, the inner oblong to lanceolate, 4.0–4.5 mm long, ca. 1 mm wide, glabrescent, all keeled, the margins scarious, brown, erose; ray florets usually 5, the ligules orbicular, 2.5–3.0 mm long, ca. 3 mm wide, white or pinkish white to ochroleucous; disc florets 10–25, the corollas 2.5–3.0 mm long, white to ochroleucous. Achenes obovate, 1.5–2.0 mm long, compressed, glabrous; pappus absent. Chromosome number:  $n = 9$  ( $x = 9$ ).<sup>3</sup>

<sup>3</sup>Chromosome numbers have been extracted from the following chromosome indexes: Fedorov, 1969; Moore, 1973, 1974, 1977.

CUZCO. Anta: Chaccan Chico, 3,490 m, *Brunel* 477 (F, MO); Santa Ana, El Chaccan, 3,492 m, *Brunel* 562 (MO), 636 (F, MO).

## II. ARTEMISIA

*Artemisia* L., Sp. Pl. 845. 1753. TYPE: *A. vulgaris* L.

Annual, biennial, or perennial **herbs** or **shrubs**, aromatic, frequently tomentose. **Leaves** alternate, entire or pinnatifid, often pedate. **Inflorescences** racemose or paniculate, rarely solitary. **Capitula** homogamous or heterogamous, numerous, pendulous, or rarely erect; involucre oblong to depressed-globose, narrowly campanulate or hemispherical; phyllaries imbricate, few-seriate, the margins scarious; receptacles convex or hemispherical, naked or conspicuously pilose; florets iso- or dimorphic, the outer pistillate, the corollas filiform, apically bi- or trifid; disc florets hermaphrodite or masculine, the corollas tubular, the limb campanulate, 5-dentate, the anthers obtuse or minutely pointed basally, the terminal appendage deltoid, sometimes subulate-acuminate, the style branches of female florets linear, truncate-penicillate, those of the hermaphrodite florets linear or linear-spatulate, usually penicillate, undivided in functionally male florets. **Achenes** subglobose to fusiform, terete or somewhat compressed, smooth, 2-ribbed or multistriate, incurved basally; pappus absent.

Approximately 400 species, primarily north temperate, including centers of diversity in Asia, Europe, and western North America. Its members tend to dominate the steppe communities of Asia, "sagebrush" communities of the New World, and the Karoo scrub of South Africa (Heywood & Humphries, 1977). The genus is represented by two naturalized weeds in Peru.

## REFERENCE

HEYWOOD, V. H., AND C. J. HUMPHRIES. 1977. Anthemideae—Systematic review. In Heywood, V. H., et al. (eds.), *The Biology and Chemistry of the Compositae*, pp. 852–898. Academic Press, London.

## KEY TO SPECIES OF *Artemisia*

1. Perennial; cauline leaves sericeous, the lobes oblong; receptacles pilose .....  
1. *A. absinthium*.
1. Annual; cauline leaves glabrous, the lobes linear-lanceolate; receptacles naked .....  
2. *A. annua*.

1. ***Artemisia absinthium*** L., Sp. Pl. 848. 1753. TYPE: Europe (western edge of Asia, ?Russia), exact locality and collector unknown (LINN, holotype, not seen, IDC Microfiche 117. 567: I. 5).

Suffrutescent, perennial **herbs** to 1 m tall, aromatic; stems erect, sericeous at least above. **Leaves** ovate in outline, 2–3-pinnatifid, 1.5–3.0 cm long, 1.5–2.5 cm wide, the ultimate segments oblong, 1.0–1.5 mm wide, subacute, grayish or whitish, sericeous on both surfaces; petioles to 2 cm long. **Inflorescences** narrow to broad panicles, bracteate. **Capitula** disciform, heterogamous, ca. 3 mm high, 3–5(–6) mm wide, pedunculate, often nodding; involucre depressed-globose; phyllaries 2–3-seriate, graduate, the outer oblong, herbaceous, 1–2 mm long, ca. 0.5 mm wide, sericeous, the inner obovate, mostly scarious, ca. 2 mm long, ca. 1.5 mm wide, glandular; receptacles conspicuously pilose; florets 20–50, the outer pistillate, fertile, the corollas filiform, to 1 mm long, the inner florets hermaphroditic, fertile, the corollas cylindric-campanulate, 1.0–1.5 mm long, all yellowish, glabrous. **Achenes** fusiform, glabrous, ca. 1 mm long. Chromosome number:  $n = 9$ .

This species is native to Eurasia and North Africa and has been introduced into the New World. It is commonly cultivated for ornamental or medicinal

purposes. In Peru, it is known as "ajenjo," a name also used for the genus *Ambrosia*.

JUNÍN. Jauja: Jauja, *Cerrate* 3810 (MO).

2. *Artemisia annua* L., Sp. Pl. 847. 1753. TYPE: Siberia, exact locality and collector unknown (LINN, holotype, not seen, IDC Microfiche 117. 566: II. 4).

Erect **annuals** to 2 m tall; stems puberulous to glabrous, reddish. **Leaves** ovate in outline, 2-3-pinnatifid, sessile, the basal segments 3-10 mm long, deeply toothed, remote from next distal pair, median segments 3-4 cm long, regularly and deeply toothed, the ultimate lobes linear-lanceolate, 1-5 mm long, 0.5-1.0 mm wide, glabrous. **Inflorescences** paniculate. **Capitula** disciform, heterogamous, 1.5-3.0 mm high, 2.0-3.5 mm wide, pedunculate, often nodding; involucre globose; phyllaries 2-3-seriate, graduate, the outer oblong, herbaceous, ca. 0.6 mm long, the inner ovate-oblong, mostly scarious, ca. 2 mm long, 1.5-2.0 mm wide; receptacles naked; florets 20-25, the outer pistillate, fertile, the corollas filiform, to 1 mm long, the inner florets hermaphroditic, fertile, the corollas cylindric-campanulate, 0.6-1.0 mm long, all yellowish, glabrous. **Achenes** narrowly turbinate, ca. 0.8 mm long, obscurely striate. Chromosome number:  $n = 9$ .

This species is a native of Asia and is widely naturalized in central and southern Europe and throughout the New World. In Peru, it is represented by cultivated material only.

JUNÍN. Jauja: Jauja, *Ridoutt s.n.* (MO).

### III. CHRYSANTHEMUM

*Chrysanthemum* L., s.l., Sp. Pl. 887. 1753. TYPE: *C. coronarium* L.

Annual **herbs**, glabrous or pubescent, often strong scented. **Leaves** alternate, the margins entire, toothed, incised or variously dissected, pubescent or glabrate. **Inflorescences** solitary or 2-5 on branch tips, often long pedunculate. **Capitula** radiate, heterogamous; involucre hemispherical or campanulate; phyllaries 3-4-seriate, imbricate, the margins scarious, the costa darkened; receptacles convex, epaleate; ray florets 13-21(-34), the ligules entire or dentate, pistillate, usually fertile, white or yellow, and rarely with reddish bases; disc florets 50-200, hermaphroditic, fertile, the corollas yellow, the tube laterally expanded and 2-winged, the anthers basally obtuse or truncate, the terminal appendage ovate, acute, the style branches narrowly oblong, truncate, penicillate. **Achenes** without vallicular secretory canals or epicarpic mucilaginous cells, those of the ray florets 3-angled, with the ribs often winged, those of the disc florets cylindrical to cylindrical-triquetrous, ribbed, the adaxial rib sometimes winged; pappus absent.

The genus *Chrysanthemum*, when interpreted in a broad sense, includes about 200 species, mainly natives of Europe, western Asia, and northern Africa, with species naturalized on nearly every continent. Considerable biosystematic evidence indicates that this genus has been quite heterogeneous, and recent workers (Heywood & Humphries, 1977) have recircumscribed the generic limits, thus limiting the genus to a group of three species: *C. carinatum*, *C. coronarium*, and *C. segetum*, all of northern Africa and Europe. These changes have been reflected in several recent floras (e.g., *Flora of Turkey*, 1975; *Flora Europaea*, 1976). In the present treatment, several taxa traditionally treated under *Chrysanthemum* s.l. are treated under other genera (cf. *Tanacetum*, *Dendranthema*, and *Leucanthemum*).

### REFERENCES

- GRIERSON, A. J. C. 1975. *Chrysanthemum*. In Davis, P. H. (ed.), *Flora of Turkey*. 5: 253-255.  
 HEYWOOD, V. H. 1976. *Chrysanthemum*. In Tutin, T. G., et al. (eds.), *Flora Europaea*. 4: 168-169.

HEYWOOD, V. H., AND C. J. HUMPHRIES. 1977. Anthemideae—Systematic review. In Heywood, V. H., et al. (eds.), *The Biology and Chemistry of the Compositae*, pp. 852–898. Academic Press, London.

1. **Chrysanthemum coronarium** L., Sp. Pl. 890. 1753. TYPE: Europe, exact locality and collector unknown (LINN, holotype, not seen, IDC Microfiche 117. 603: II. 3).

Annual **herbs** to 0.75 m tall; stems erect, glabrous. **Leaves** oblong to obovate in outline, 2–3-pinnatifid, to 5 cm long, 2–3 cm wide, sessile, the ultimate segments 1–2 mm wide, acute. **Inflorescences** solitary; peduncles 5–15 cm long, ebractate. **Capitula** ca. 1 cm high, 1.0–1.5 cm wide (excluding rays); involucre hemispherical; phyllaries 3-seriate, ovate-oblong, 5–10 mm long, 3–5 mm wide, the margins scarious, brownish; ray florets ca. 21(–34), the ligules 1.0–1.5 cm long, ca. 5 mm wide, yellow, cream, or white; disc florets 50–100, the corollas 4–5 mm long, yellow. **Achenes** dimorphic, the outer triquetrous, the angles produced into wings to 1.5 mm wide, the inner laterally compressed with adaxial wings, prominent ribs on abaxial face and rounded ribs on lateral faces, sometimes those of the center lacking wings, all covered with sessile, non-mucilaginous glands. Chromosome number:  $n = 9$ .

This species is native to the Mediterranean region and is now a widespread weed in many temperate areas. In Peru, it is cultivated for ornament and often escapes to roadsides and waste places.

JUNÍN. Jauja: Jauja, *Ridoutt s.n.* (MO). CUZCO. Anta: Chaccan Chico, El Chaccan, 3,490 m, *Brunel 484* (MO).

#### IV. COTULA

**Cotula** L., Sp. Pl. 891. 1753. TYPE: *C. coronopifolia* L.

Annual or perennial **herbs**, often diminutive, prostrate to decumbent, often rhizomatous or stoloniferous, glabrous to pilose, often with pellucid glands. **Leaves** alternate, 2–3-pinnatifid, rarely simple, toothed to entire, petiolate or not, the bases amplexicaul or only partly so. **Inflorescences** solitary, terminal and axillary; peduncles sometimes swollen under the capitula. **Capitula** monoecious, dioecious, or gynomonoecious, disciform, heterogamous; involucre hemispherical to campanulate; phyllaries 2–many-seriate, subequal, herbaceous, scarious at least marginally; receptacles conical, flat or convex, rarely hemispherical; epaleate; marginal florets pistillate, 1–many-seriate, the corollas filiform, sometimes 2-toothed or with a minute ligula (sometimes corollas lacking); disc florets hermaphroditic, fertile, or functionally male, the corollas cylindric-campanulate, funnelform, or tubular, sometimes with the bases sheathing and extending over the ovary, 4-lobed (rarely 3-lobed), the anthers 4 (rarely 3), basally obtuse or minutely tailed, the terminal appendage ovate or lanceolate, the style branches of the marginal florets linear-lanceolate, of the disc florets oblong, truncate, penicillate. **Achenes** generally stipitate, terete, or dorsally compressed, winged or not, dorsally convex; pappus absent.

About 90 species, almost cosmopolitan, but mainly South African and in New Zealand, some in North America, Asia, Australia, New Guinea, South America, and the Falkland Islands.

#### REFERENCE

CARO, J. A. 1961. Las especies de *Cotula* (Compositae) del centro de la Republica Argentina. *Kurtziana* 1: 289–298.

#### KEY TO SPECIES OF *Cotula*

1. Receptacle pilose; disc corollas 3-lobed, stamens 3; achenes isomorphic .....  
3. *C. mexicana*.

1. Receptacle glabrous; disc corollas 4-lobed, stamens 4; achenes dimorphic ..... 2.
  2. Plants annual, pubescent; marginal florets in 3 series; disc corollas white .....
    1. *C. australis*.
  2. Plants perennial, glabrous; marginal florets in 1 series; disc corollas yellow .....
    2. *C. coronopifolia*.

1. *Cotula australis* (Sieb. ex Spreng.) Hook. f., Fl. Nov. Zel. 128. 1853.

*Anacyclus australis* Sieb. ex Spreng., Syst. Veg. 3: 497. 1826. TYPE: New Zealand ("Nov. Holl."), exact locality and collector unknown (?P [Herb. Cosson], holotype, not seen).

Annual **herbs** to 20 cm tall, basally branched, thinly villous. **Leaves** 1-2-pinnatifid, oblong in outline, to 6 cm long, to 2 cm wide, the lobes linear-lanceolate, acute, often glabrous above, villous below, sessile, the bases dilated, subamplexicaul. **Inflorescences** solitary, terminating branches; peduncles to 8 cm long, villous with appressed, ascending trichomes. **Capitula** monoecious, disciform, heterogamous, ca. 2 mm high, 4-5 mm wide; involucre hemispherical; phyllaries 2-seriate, equal, oblong, 1.5-2.0 mm long, 0.6-1.0 mm wide, apically obtuse or rounded, the margins scarious; marginal florets stipitate, pistillate, the corollas absent; disc florets hermaphroditic, the corollas tubular, 0.6-0.8 mm long, 4-lobed, white. **Achenes** dimorphic, the outer oblong, ca. 1 mm long, dorsally compressed, laterally winged, glandular, the inner ones obconical, 0.5-0.8 mm long, flattened on the inner face, convex on the outer face, the margins thickened. Chromosome number:  $n = 10$ .

This species was originally described from New Zealand and is naturalized in many regions of the world. It is widespread in Peru, occupying a wide range of habitats.

AMAZONAS. Chachapoyas: ca. 43 km NE of Balsas on road to Chachapoyas, ca. 2,900 m, *Dillon & Turner* 1720 (F, USM). AREQUIPA. Caraveli: Lomas de Ocopa, entre Uauca y Atiquipa, 500-600 m, *Ferreya* 11478 (MO); Islay: Mollendo, 1,500-2,000 m, *Ferreya* 18658 (MO), Lomas de Mollendo, 560 m, *Herrera-Rivera* 40 (MO), 7 km de Matarani, 800 m, *Lopez* 6 (MO). CAJAMARCA. Cajamarca: Sunchubaba, 2,410 m, *Cabanillas et al.* 7 (MO); Celendin: ca 23 km SW of Celendin, 3,100 m, *Dillon & Turner* 1645 (F, MO, TEX, USM). JUNÍN. Tarma: Paucartambo, 2,800 m, *Woytkowski* 6694 (F, MO). LA LIBERTAD. Trujillo: Barraza, 50 m, *Lopez & Sagastegui* 7990 (MO). LIMA. Canta: Rucuma, entre Canta y Obrajillo, 2,700 m, *Mexa* 159 (MO), San Buenaventura, 2,700-2,800 m, *Pennell* 14570 (F), Puru-marca, cerca a Canta, *Sanchez* 52 (MO); Chancay: Lomas de Lachay, km 88 carretera Panamericana Norte, 400 m, *Cerrate* 5738 (MO), Naupay, 2,700 m, *Cerrate et al.* 6315 (MO), Lomas de Chancay, 300 m, *Ferreya* 8744 (MO), Lachay, entre Chancay y Huacho, 380-400 m, *Ferreya* 8765 (MO); Huarochiri: Viso, 2,740 m, *Macbride & Featherstone* 637 (F); Lima: Lomas de Lurin, 350-400 m, *Ferreya* 11920 (MO), Loma de Amancae, 120-410 m, *Gentry* 16479 (F, MO). PIURA. Huancabamba: 40-43 km E of Olmos on road to Pucara, 1,600-1,850 m, *Gentry et al.* 22664 (F, MO, USM).

2. *Cotula coronopifolia* L., Sp. Pl. 892. 1753. TYPE: Ethiopia, exact locality and collector unknown (LINN, holotype, not seen, IDC Microfiche 117. 605: I. 4).

Perennial **herbs** to 20 cm tall; stems stoloniferous, glabrous, usually much-branched, ascending. **Leaves** linear to lanceolate, entire to deeply lacinate, or 1-2-pinnatifid, 2-5 cm long, 0.5-1.5 cm wide, glabrous, the bases sessile and sheathing. **Inflorescences** solitary, terminal; peduncles to 6 cm long, glabrous. **Capitula** monoecious, disciform, heterogamous, 2-3 mm high, 9-10 mm wide; involucre hemispherical; phyllaries 3-seriate, equal, oblong-lanceolate, 3-5 mm long, 1-2 mm wide, apically obtuse, glabrous, striate, the

margins scarious; marginal florets uniseriate, stipitate, pistillate, the corollas absent; disc florets hermaphroditic, the corollas tubular, 1.2–1.5 mm long, 4-lobed, yellow. **Achenes** dimorphic, the outer oblong, 1.3–1.8 mm long, dorsally compressed, laterally winged, glandular, the inner ones obconical, 1.0–1.3 mm long, flattened on the inner face, convex on the outer face, the margins thickened. Chromosome number:  $n = 10$ .

This species was originally described from Africa and is adventive throughout the world. It frequently inhabits aquatic or inundated areas in fresh- and salt-water.

**AREQUIPA.** Arequipa: alrededores de los Baños de Jesus, cerca de Arequipa, 2,400–2,600 m, *Ferreya* 12047 (MO), Yura, ca. 2,700 m, *Solomon* 2826 (MO), Chilean Valley, *Stafford* 566 (F), no exact locality, *Vargas* 2030 (MO); Islay: cerca a Mollendo, 300 m, *Ferreya* 12098 (MO). **PUNO.** Puno: near Puno, 4,000 m, *Soukup* 410 (F).

### 3. *Cotula mexicana* (DC.) Cabrera, Bol. Soc. Argent. Bot. 8: 207. 1960.

*Hippia minuta* L. f., Suppl. 389. 1781. TYPE: LINN, not seen.

*Soliva pedicellata* Ruiz & Pavon, Syst. Veg. 215. 1798. TYPE: Peru, exact locality unknown, Ruiz & Pavon s.n. (MA, not seen).

*Soliva pygmaea* H.B.K., Nov. Gen. Sp. Pl. 4: 238. ed. fol. 1818. TYPE: Colombia, Tolima, "Andium Quindeunsim," *Humboldt & Bonpland* s.n. (P, holotype, not seen, IDC Microfiche 6209. 113: II. 4).

*Gymnostyles minuta* (L. f.) Spreng., Syst. Veg. 3: 500. 1826. TYPE: based upon *Hippia minuta* L. f.

*Gymnostyles peruviana* Spreng., Syst. Veg. 3: 500. 1826. *nom. superfl.* (Based upon *Soliva pedicellata* Ruiz & Pavon.)

*Soliva minuta* (L. f.) Sweet, Hort. Brit. ed. 2. 217. 1830.

*Soliva mexicana* DC., Prodr. 6: 143. 1837. TYPE: Mexico, no exact locality, *Sesse & Mocino* 3959 (G, holotype illustration; F, isotype specimen).

*Soliva pedunculata* Ruiz & Pavon ex Steudel, Nom. Bot. ed. 2, 2: 609. 1841. *orth. mut.*

*Cotula pygmaea* (H. B. K.) Benth. & Hook. ex Hemsl., Biol. Centr. Amer. Bot. 2: 230. 1881 (non *C. pygmaea* Poir., Encyc. Suppl. 2: 371, 1810).

*Cotula minuta* (L. f.) Schinz, Mem. Soc. Sci. Nat. Neuchâtel 5: 429. 1913 (non *C. minuta* Forster, Prodr. 57. 1786).

*Lancisia minuta* (L. f.) Rydb., N. Amer. Flora 43: 287. 1916.

*Cotula pedicellata* (Ruiz & Pavon) Cabrera, Notas Mus. La Plata, Bot., 14: 139. 1949 (non *C. pedicellata* Compton, J. S. African Bot. 7: 189. 1941).

*Cotula cabrera* Caro, Kurtziana 1: 295. 1961. *nom. superfl.* (Based upon *Soliva pedicellata* Ruiz & Pavon.)

Annual, diminutive **herbs** to 3 cm tall; stems ascending to procumbent, pubescent. **Leaves** pinnatifid, 1–2(–3) cm long (including petiole), 5–15 mm wide, oblanceolate in outline, the segments oblanceolate to elliptic, 4-paired, 2–5 mm long, 0.6–0.9 mm wide, apically obtuse to subacute, mucronate, entire, glabrous to sparsely villous, villous below; petioles 5–10 mm long, villous, basally dilated, subamplexicaul. **Inflorescences** solitary; peduncles axillary, to 1 cm long, villous. **Capitula** monoecious, disciform, heterogamous, 1.5–2.0 mm high, ca. 2 mm wide; involucre campanulate; phyllaries 2-seriate, equal, oblong, 1.0–1.2 mm long, 0.4–0.5 mm wide, sparsely villous, apically obtuse to acute, roseate, the margins scarious; receptacles flat, pilose; marginal florets 2-seriate, stipitate, pistillate, fertile, ca. 10, the corollas absent, the stipe ca. 0.2 mm long, the ovary obovate to oblong, compressed; disc florets ca. 3, hermaphroditic, functionally male, the corollas tubular, ca. 1 mm long, 3-lobed, white. **Achenes** isomorphic, obovate, 1.3–1.5 mm long, 0.8–1.0 mm wide, dorsally compressed, laterally 2-winged, smooth, glabrous. Chromosome number:  $n = \text{ca. } 56$ .

This species occupies humid, montane habitats from Mexico to Costa Rica and from Colombia to Argentina. In Peru, it is only known from a few collections from Depto. Amazonas in the north and Depto. Puno in the south.



FIG. 1. *Cotula mexicana*. (From Wurdack 1331, F.)

The earliest legitimate specific epithet for this taxon is *mexicana*; the epithets *minuta*, *pygmaea*, and *pedicellata* are all illegitimate due to homonymy.

AMAZONAS. Chachapoyas: middle eastern Calla-Calla slopes, near km 411-416 of Leimebamba-Balsas road, 3,100-3,250 m, Wurdack 1331 (F). PUNO. Carabaya: Crucero Alto, 4,540 m, Stafford 654 (F); Azangaro: Chuquibambilla, 3,850-3,900 m, Pennell 13391 (F).

## V. DENDRANTHEMA

**Dendranthema** (DC.) Des Moul., Actes Soc. Linn. Bordeaux 20: 561. 1860. TYPE: *D. indicum* (L.) Des Moul. = *Chrysanthemum indicum* L.

Perennial herbs, or rarely suffrutescent. Leaves alternate, oblanceolate to ovate, lobed to 2-pinnatifid (rarely entire), petiolate. Inflorescences solitary to corymbose. Capitula radiate, heterogamous; involucre hemispherical; phyllaries ca. 3-seriate, imbricate, marginally scarious, brown, erose; receptacles convex to conical, epaleate (paleae present in multi-seriate rayed cultivars); ray florets pistillate, fertile or sterile, the ligules white to purple or yellow (variously colored in cultivars); disc florets hermaphroditic (absent in some cultivars), the corollas tubular-obconical, usually yellow, the tube unwinged, apically 5-lobed, the anthers basally obtuse, the terminal appendage lanceolate to ovate, the style branches oblong, truncate, penicillate. Achenes isomorphic, cylindrical-obconical, 5-8-ribbed, without vallicular secretory canals, with or without epicarpic mucilaginous cells; pappus absent. Chromosome number:  $n = 9$  ( $x = 9$ ).

The genus consists of some 50 species of perennial herbs and subshrubs distributed throughout the Far East, including China, Japan, Korea, Mongolia, USSR, and Europe. The genus is of considerable horticultural interest, with some 7,000 cultivars of autumn-flowering chrysanthemums derived from *Dendranthema morifolium*, the hybrid product of various native species (Heywood & Humphries, 1977).

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### 1. *Dendranthema morifolium* (Ramat.) Tzvel. Flora U.R.S.S. 26: 373. 1961.

*Chrysanthemum morifolium* Ramat., J. Hist. Nat. 2: 240. 1792. TYPE: presumably P, not seen.

Suffrutescent perennial herbs to 1.5 m tall, aromatic; stems erect or spreading, leafy. Leaves lanceolate to ovate, 4-9(-12) cm long, 4-6 cm wide, lobed, the segments entire to coarsely toothed, the upper surface glabrous, the lower pilose with 2-armed trichomes, glandular; petioles to 4 cm long, 2 auriculate segments basally. Inflorescences laxly corymbose; peduncles bracteate. Capitula radiate; involucre hemispherical; phyllaries herbaceous, the outer lanceolate to oblong, 5-8 mm long, 1-2 mm wide, the inner ovate, 8-10 mm long, 2-3 mm wide, the margins broadly scarious; receptacles strongly convex, paleate; ray florets multi-seriate, numerous, pistillate, the ligules 1-8 cm long, variously colored (commonly purple or yellow); disc florets absent in ours. Achenes 1.0-1.5 mm long, sterile.

Autumn-flowering perennial chrysanthemums were successfully introduced

from China to France in 1789, and in 1792 the French botanist Ramatuelle proposed the name *Chrysanthemum morifolium* (= *Dendranthema morifolium*) for one of these cultivars called "Old Purple" (Gosling, 1970). Although its origin is obscure, this cultivar is thought to be of hybrid origin, derived from several native Far Eastern species, including *D. indicum*, *D. japonense*, *D. makinai*, and *D. ornatum* (Bailey, 1976). It is not known when it was first introduced into the New World.

The specimens examined thus far from Peru lack disc florets, with the ray florets produced in multiple series. Each ray floret is subtended by a palea, closely resembling an inner phyllary. These cultivars are sterile and are propagated through cuttings. In Peru, they are called "crisanthema."

CUZCO. Anta: Chaccan Chico, El Chaccan, 3,493 m, Brunel 734 (MO). LORETO. Alto Amazonas: Yurimaguas, lower Rio Huallaga, 155–210 m, Williams 4332 (F), 4517 (MO); Maynas: Iquitos and vicinity, 120 m, Williams 3607 (F), 8212 (MO). SAN MARTÍN. San Martín: Tarapoto, 750 m, Williams 5931 (F), Alto Rio Huallaga, 360–900 m, Williams 6607 (F).

## VI. LEUCANTHEMUM

*Leucanthemum* Mill., Gard. Dict. Abridg. ed. 4. 1754. TYPE: *L. vulgare* Lam.

Perennial, rarely annual herbs. Leaves alternate, oblong, spatulate or obovate, the margins crenate, serrate or pinnatifid. Inflorescences solitary or rarely lax corymbs. Capitula radiate, heterogamous, rarely disciform or discoid; involucre hemispherical; phyllaries 3–4-seriate, imbricate, lanceolate to oblong, the margins scarious; receptacles usually convex, epaleate; marginal florets usually ligulate, pistillate, fertile, the corollas white or pinkish, rarely yellow, rarely tubular-campanulate, hermaphroditic or pistillate, yellow; disc florets hermaphroditic, fertile, the corollas tubular, 5-lobed, yellow, the anthers basally obtuse, the terminal appendage ovate, the style branches truncate, penicillate. Achenes isomorphic, oblong-cylindrical, 10-ribbed, the ribs bearing myxogenic cells, vallecular secretory canals present; pappus a corona or auricle, sometimes rudimentary or only on marginal achenes, or absent.

A genus of approximately 25 species native to Europe, North Africa, and southwest Asia. In Peru, the genus is represented by the cultivated taxon, *Leucanthemum vulgare* (= *Chrysanthemum leucanthemum* L.), which occasionally escapes and appears naturalized.

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1. *Leucanthemum vulgare* Lam., Fl. Francoise 2: 137. 1778. TYPE: based upon *Chrysanthemum leucanthemum* L.

*Chrysanthemum leucanthemum* L., Sp. Pl. 888. 1753. LECTOTYPE (designated by Bocher & Larsen, 1957): Europe, exact locality and collector unknown, Herb. Cliff. (BM, not seen).

Perennial herbs to 1 m tall, aromatic; stems simple or sparsely branched, glabrous. Basal leaves obovate-spatulate to oblong-obovate, to 15 cm long, incised to crenate, petiolate;

cauline leaves oblong to oblong-lanceolate, to 10 cm long, remotely denticulate or entire, sessile and somewhat clasping at the base, glabrous. **Inflorescences** solitary. **Capitula** radiate, heterogamous, ca. 1 cm high, 1.5–2.0 cm wide (excluding rays); phyllaries lanceolate to oblong, the outer 6–9 mm long, 2.0–2.5 mm wide, the inner ca. 10 mm long, 2.5–3.0 mm wide, the margins scarious, brownish, erose; receptacles convex; ray florets 21–34, the ligules oblong, 2.5–3.0 cm long, ca. 5 mm wide, apically denticulate, the tube 1–2 mm long, white; disc florets 200–300, the corollas tubular, 3–4 mm long, yellow. **Achenes** 2.0–2.5 mm long, blackish with prominent, pale-colored ribs, glabrous; pappus a corona or short unilateral auricle, or absent. Chromosome number:  $n = 9$  (18, 27, 36, 45, 54).

This species, or species-complex, is native to temperate Eurasia from western Europe to China and naturalized throughout North and South America. It is extremely variable within its range in the Old World and has been divided into a large number of questionable species (Heywood, 1976). Individuals occurring in Peru have been previously referred to *Leucanthemum maximum* (Ramond) DC., which is a commonly cultivated, cytological variant ( $n = 45$  or 54). Although the plants within our range do possess larger cauline and basal leaves and larger capitula, current taxonomic treatments view it simply as a variant of *L. vulgare* (Heywood, 1976).

Its common name in Peru is "margarita."

CUZCO. Anta: El Chaccan, 3,550 m, Brunel 268 (F, MO).

## VII. MATRICARIA

**Matricaria** L., Sp. Pl. 890. 1753. LECTOTYPE (as designated by Pobedimova, 1961): *Matricaria recutita* L.

Annual herbs, strongly aromatic or odorless. **Leaves** alternate, variously pinnatifid, the ultimate segments linear or filiform. **Inflorescences** solitary or sometimes corymbose. **Capitula** radiate, heterogamous, rarely discoid and homogamous; involucre campanulate to hemispherical; phyllaries 2–3-seriate, equal to subequal, the margins membranous or scarious; receptacles conical, elongating in fruit, epaleate; ray florets (when present) pistillate, fertile or sterile, the ligules white, tridentate; disc florets hermaphroditic, the corollas tubular to cylindric-campanulate, 5-lobed, the anthers basally obtuse, the terminal appendage deltoid, acute, the style branches oblong, truncate, penicillate. **Achenes** isomorphic, oblong to obovate, often incurved, strongly 3–5-ribbed, glabrous; pappus absent or minutely coroniform.

This genus, when interpreted in the narrowest sense, consists of about five species of northern hemispheric annuals and represents a Mediterranean divergence from the closely related genus *Anthemis* L. (Heywood & Humphries, 1977). *Matricaria* also shares relationships with *Tripleurospermum* Sch. Bip., a distinct genus of some 30 species of Europe, Asia, and North Africa.

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1. *Matricaria recutita*<sup>4</sup> L., Sp. Pl. 891. 1753. TYPE: Europe, exact locality and collector unknown (LINN or BM, not seen).

*Matricaria courrantiana* DC., Prodr. 6: 52. 1837. TYPE: ex Teneriffa, *Courrant s.n.* (G-DC, holotype, not seen, IDC Microfiche 800. 1002: III.2).

Annual **herbs** to 45 cm tall, aromatic; stems erect, branched, striate, glabrous. **Leaves** oblong in outline, 5–7 cm long, 2–3-pinnatifid, the primary segments 10–12-paired, narrowly linear. **Inflorescences** solitary or rarely laxly corymbose; peduncles 1–9 cm long. **Capitula** radiate, heterogamous, 5–6 mm high, 5–6 mm wide (excluding rays); involucre hemispherical; phyllaries 2-seriate, equal, lanceolate to oblanceolate, 2.5–3.0 mm long, 0.3–0.8 mm wide, apically acute to obtuse, the margins membranous, erose, brown; receptacles conical, hollow, epaleate; ray florets 12–15, pistillate, fertile, the ligules oblong, 5–8 mm long, 2–3 mm wide, tridentate, white; disc florets 200–400, the corollas tubular, 1.2–1.5 mm long, yellow. **Achenes** obovate, 0.6–0.9 mm long, smooth dorsally, the inner surface 3–5-ribbed, glabrous, apically truncate; pappus absent, or a membranous corona, fimbriate, white, 0.3–0.9 mm long (disc), 1.3–1.9 mm long (rays). Chromosome number:  $n = 9$ .

This taxon has its origin in Eurasia and is adventive in the New World. It is commonly found in markets of Central and South America, where it is sold for preparation of tea used for stomach troubles. In Peru, it is commonly cultivated and frequently escapes, becoming naturalized in fields and other disturbed areas. It is called "manzanilla" throughout Central and South America.

CUZCO. Anta: Cillapuya, El Chaccan, 3,613 m, Brunel 302 (F, MO); Cuzco: 2 km S of San Jeranimo, 10 km SE of Cuzco, Solomon 3009 (MO). LIMA. Huarochiri: Matucana, Macbride & Featherstone 458 (F).

### VIII. PLAGIOCHEILUS

**Plagiocheilus** Arnott ex DC., Prodr. 6: 142. 1837. TYPE: *P. tanacetoides* Haenke ex DC.

*Hippia* H.B.K., Nov. Gen. Sp. Pl. 4: 301. 1820, not *Hippia* L., Mant. Pl. Alt.: 158, 291. 1771. TYPE: *H. peduncularis* H.B.K. = *P. peduncularis* (H.B.K.) Wedd.

Annual or perennial **herbs**. **Leaves** alternate, 1–2-pinnatifid. **Inflorescences** solitary or corymbose. **Capitula** disciform, heterogamous; involucre hemispherical; phyllaries 2–3-seriate; receptacles convex to conical; marginal florets multiseriate, pistillate, the ligules bilabiate, the outer entire or bidentate, the inner short, entire or bidentate, white; disc florets hermaphroditic, functionally male, the corollas funnellform, yellow, (4–)5-lobed, the anthers basally obtuse, the terminal appendages ovate, the style branches of marginal florets long, filiform, of the disc florets short, truncate. **Achenes** obconical, subcompressed laterally, glandular, puberulent or glabrous; pappus absent.

A genus of perhaps five species from Colombia to Argentina. In Peru, three species are known from various high-elevation, moist habitats.

The tribal status of this genus is open to question. Grau (1977) and Robinson & Brettell (1973) have suggested that it belongs in the Astereae. However, it is here accepted in the Anthemideae, a position supported by its general morphology, breeding system, and floral biology (Heywood & Humphries, 1977; Turner, pers. comm.). Its closest affinities appear to be with other southern hemispheric genera, including *Cotula*, *Centipeda*, *Soliva*, and *Abrotanella*.

<sup>4</sup>Other synonyms are listed by Grierson (1974). Only the names listed have been used for Peruvian material.

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KEY TO SPECIES OF *Plagiocheilus*

1. Inflorescences corymbose ..... 1. *P. bogotensis*.
1. Inflorescences solitary ..... 2.
2. Leaves 2-pinnatifid, pilose with flaccid, uniseriate trichomes ... 3. *P. solivaeformis*.
2. Leaves 1-pinnatifid, arachnoid-tomentose ..... 2. *P. frigidus*.

1. *Plagiocheilus bogotensis* (H.B.K.) Wedd., Chlor. And. 1: 62. 1865.

*Hippia bogotensis* H.B.K., Nov. Gen. Sp. Pl. 4: 237. ed. fol. 1818. TYPE: Colombia, Cundinamarca, "prope Santa Fe de Bogota," Humboldt & Bonpland s.n. (P, holotype, not seen, IDC Microfiche 6209. 113: II. 2).

*Leptinella bogotensis* (H.B.K.) DC., Prodr. 6: 142. 1837.

*Plagiocheilus prostratus* Benth., Pl. Hartw. 136. 1844. TYPE: Ecuador, Loja, "in montibus Loxa," Hartweg s.n. (K, holotype, not seen; P, isotype, not seen; F, photo).

Annual or perennial herbs to 0.3 m tall; stems decumbent to ascending, arachnoid to glabrate. Basal leaves obovate-spatulate to oblong-obovate in outline, to 14 cm long (including petiole), 2-pinnatifid, the ultimate segments lanceolate, sparsely pilose; petioles to 5 cm long, basally dilated, clasping; cauline leaves ovate to obovate in outline, 2.0-3.5 cm long, 1.5-2.0 cm wide, 2-pinnatifid, the segments lanceolate, pilose, sessile, the bases dilated, incised, clasping. Inflorescences corymbose. Capitula 2-3 mm high, 4-5 mm wide; phyllaries 2-seriate, equal, broadly lanceolate to ovate, ca. 1.5 mm long, ca. 1 mm wide, apically obtuse, the margins scarious, nerved, persistent; marginal florets multiseriate, pistillate, the ligules white, bilabiate, the outer narrowly spatulate, ca. 0.5 mm long, the inner minute; disc florets 30-50, the corollas funnelform, ca. 1.5 mm long, 5-lobed, yellow. Achenes obconical, subcompressed laterally, ca. 3 mm long, puberulent, glandular, whitish; pappus absent.

*Plagiocheilus bogotensis* occupies moist, montane habitats from Colombia to northern Peru (2,100-3,100 m). It most closely resembles *P. tanacetoides* Haenke, a lowland, annual species of northeastern Argentina and is distinguished from that species by its more deeply incised and generally less pubescent leaf segments.

Bentham's *Plagiocheilus prostrata*, described from Ecuador, appears to be a variation in habit and is here reduced to synonymy.

AMAZONAS. Luya: Leimebamba, 2,100 m, Woytkowski 7802 (F, MO). CAJAMARCA. Cajamarca: Pampa de la Culebra, around la Encañada, 2,900 m, Sagastegui et al. 8076 (F, MO). LA LIBERTAD. Huamachuco: mountain slopes above Yamobamba, 3,000-3,100 m, Conrad 2726 (F, MO); Santiago de Chuco: above Cachicadan, 2,800 m, Stork & Horton 9977 (F, MO).

2. *Plagiocheilus frigidus* Poepp. & Endlich., Nov. Gen. Sp. Pl. 3: 48, t. 248B. 1843. TYPE: Peru, Pasco, "circum Cerro de Pasco," Poeppig s.n. (W, holotype, not seen).



FIG. 2. *Plagiocheilus frigidus*. (From Gentry et al. 19226, MO.)

Perennial, suffruticose **herbs**, caespitose; stems stoloniform. **Leaves** oblong-spatulate in outline, 8–25 mm long (including petiole), ca. 5 mm wide, pinnatifid, the segments entire or 1-lobed, lanceolate, 1.5–2.5 mm long, 0.6–1.0 mm wide, apiculate, glabrous to sparsely arachnoid; petioles to 1 cm long, margined, basally arachnoid. **Inflorescences** solitary; peduncles to ca. 2 cm long, 1–2-bracteolate, the bracteoles linear to oblanceolate, entire to laciniate. **Capitula** 2.5–3.0 mm high, 4–5 mm wide; phyllaries ca. 3-seriate, oblong-lanceolate to obovate, 1.5–2.0 mm long, ca. 1 mm wide, apically obtuse to rounded, the margins scarious; marginal florets multiseriate, pistillate, the ligules white, bilabiate, the outer oval, ca. 0.2–0.4 mm long, entire to retuse, the inner minute, cleft; disc florets 20–40, the corollas funnelform, 1.0–1.5 mm long, 5-lobed, yellow. **Achenes** obconical, subcompressed laterally, ca. 1 mm long, glandular, glabrous; pappus absent.

*Plagiocheilus frigidus* appears to be restricted to the type locality, in the vicinity of the Lago de Junín in Depto. Pasco (ca. 4,100 m).

PASCO. Pasco: vicinity of Lago de Junín, between Junín & Cerro de Pasco, Gentry et al. 19226 (MO).

3. *Plagiocheilus solivaeformis* DC., Prodr. 6: 142. 1837. TYPE: Bolivia, no exact locality, 1829, *Pentland s.n.* (G–DC, holotype, not seen, IDC Microfiche 800. 1035: I. 4).

Prostrate **herbs**; stems stoloniform. **Leaves** ovate-spatulate in outline, 1.0–2.5 cm long (including petiole), 6–10 mm wide, 2-pinnatifid, the ultimate segments unequally 2–5-

lobed, sparsely to densely pilose with flaccid, uniseriate trichomes; petioles 5–15 mm long, ciliate. **Inflorescences** solitary; peduncles 0.5–6.0 cm long, 1–3-bracteolate, the bracteoles linear to oblanceolate, entire to pinnatifid. **Capitula** 3–4 mm high, ca. 5 mm wide; phyllaries 2-seriate, oblong to obovate, ca. 2 mm long, 1.0–1.2 mm wide, apically obtuse to rounded, the margins scarious; marginal florets multiseriate, pistillate, the ligules white, bilabiate, the outer oval, ca. 0.5 mm long, entire to retuse, the inner minute, cleft; disc florets 20–50, the corollas funnelform, ca. 2 mm long, 5-lobed, yellow. **Achenes** obconical, subcompressed laterally, ca. 1 mm long, glandular, glabrous; pappus absent.

*Plagiocheilus solivaeformis* is distributed from Colombia to Bolivia in moist, montane habitats (2,700–4,500 m). It has considerable morphological variation within its range and several of these morphs have been afforded specific status (*P. peduncularis* in Ecuador, and *P. ciliata* in Bolivia). In Colombia, Cuatrecasas (1954) has recognized two subspecies, *P. solivaeformis* subsp. *colombianus* Cuatr. and subsp. *multiflorus* Cuatr., based upon the degree of leaf division and capitula size. The Peruvian material examined in the present study appears typical for the species.

AMAZONAS. Chachapoyas: uppermost slopes and summit of Cerros de Calla-Calla, near kms. 403–407 of Balsas-Leimebamba road, 3,400–3,550 m, *Wurdack* 1712 (F). HUÁNUCO. Huanuco: forests cerca Pillao, 2,700 m, *Woytkowski* 34103 (F, MO); 6 miles S of Mito, ca. 3,353 m, *Macbride & Featherstone* 1888 (F). LA LIBERTAD. Sánchez Carrión: no exact locality, *Sagastegui* 9442 (F, MO).

## IX. SANTOLINA

*Santolina* L., Sp. Pl. 842. 1753. TYPE: *S. chamaecyparissus* L.

**Shrubs** to **subshrubs**, rarely herbaceous, strongly aromatic; stems decumbent or ascending, much-branched, leafy. **Leaves** alternate, pinnatifid, the segments pectinate or conferted, sessile. **Inflorescences** solitary. **Capitula** discoid, homogamous; involucre hemispherical; phyllaries 3–4-seriate, imbricate, the margins scarious; receptacles convex, paleaceous; disc florets hermaphroditic, the corollas tubular, 5-lobed, expanded basally and encircling the top of the achenes, yellow to white, the anthers basally obtuse, the style branches flattened, truncate, penicillate. **Achenes** 3–4(–5)-angled in section, glabrous; pappus absent. Chromosome number:  $n = 9$  ( $x = 9$ ).

A genus of some 18 species from western Mediterranean regions. Various members are cultivated for ornament and often become established in waste places.

1. *Santolina chamaecyparissus* L., Sp. Pl. 842. 1753. TYPE: Europe, exact locality and collector unknown (LINN, holotype, not seen, IDC Microfiche 117. 561: III. 2).

**Subshrubs** to 20 cm tall; stems erect or ascending, green to gray, tomentose. **Leaves** narrowly linear or oblanceolate in outline, 5–15(–30) mm long, densely pectinate-dentate to pinnatifid, often vermiform, tomentose-puberulent, aromatic, the segments to 2 mm long, obtuse. **Inflorescences** solitary; peduncles to 3 cm long. **Capitula** 5–6 mm high, 5–8 mm wide; involucre hemispherical, phyllaries 3-seriate, lanceolate to obovate, 3.0–3.5 mm long, 0.75–1.0 mm wide, carinate, tomentose-puberulent, the outer apically narrowly oblong, scarious, lacerate, the inner apically rounded, scarious, lacerate; receptacles convex, paleaceous, the paleae ca. 3.5 mm long, enfolding the florets, scarious, apically puberulent; florets 100–150, the corollas cylindrical to narrowly funnelform, 3.0–3.5 mm long, conspicuously exceeding the involucre, the tube of the marginal florets usually curved, cream to bright yellow. **Achenes** narrowly obconical, 1.5–2.0 mm long, 3–4-angled in section, glabrous.

This taxon is commonly cultivated for ornamental purposes and was probably introduced in Peru from the Mediterranean region where it is native.

LIMA. Lima: Lima, *Soukup* 995 (F).

## X. SOLIVA

**Soliva** Ruiz & Pavon, *Flor. Peruv. Chil. Prodr.*: 113, t. 24. 1794. TYPE: *S. sessilis* Ruiz & Pavon.

Annual **herbs** to 15 cm tall, rosulate, essentially acaulescent; stems stoloniferous. **Leaves** alternate, deeply 3-pinnatifid or rarely 2-pinnatifid, the segments lance-linear or linear-deltoid; petioles slender. **Inflorescences** solitary, sessile in clusters of leaves. **Capitula** disciform, heterogamous; involucre hemispherical; phyllaries 2-seriate, subequal, the margins scarious or membranous; receptacles flat to subconical, epaleate; marginal florets pistillate, fertile, the corollas absent; disc florets hermaphroditic, functionally male, the corollas funnellform, 4-lobed, white, the anthers 4, basally obtuse, the terminal appendages ovate, the styles of the marginal florets rigid, spinelike, apically bifurcated, the branches filiform, caducous, of the disc florets undivided, truncate, penicillate. **Achenes** dorsiventrally flattened, convex, often with lateral wings or thickenings, crowned by the persistent styles, equaling the achenes in length; pappus absent. Chromosome numbers:  $n = +55$ , 59-60.

A genus of approximately nine species centered in southern South America, but adventive in North America, Europe, Asia, Australia, and New Zealand. Only two species have been collected in Peru.

## REFERENCE

CABRERA, A. L. 1949. Sinopsis del género *Soliva* (Compositae). *Notas Mus. La Plata, Bot.* 14: 123-139.

## KEY TO SPECIES OF *Soliva*

1. Achenes obovate, with thin, planar wings, glabrous ..... 1. *S. neglecta*.
1. Achenes narrowly oblong, with narrow, thickened wings, transversely rugose ..... 2. *S. stolonifera*.

1. ***Soliva neglecta*** Cabrera, *Notas Mus. La Plata, Bot.* 14: 128. 1949. TYPE: Argentina, Jujuy, Santa Ana, en praderas a 3,100 m, *Burkart & Troncoso* 11665 (LP, holotype, not seen; SI, isotype, not seen).

Annual **herbs** to 4 cm tall, acaulescent; stems stoloniferous, villous. **Leaves** rosulate, oblanceolate-spatulate in outline, 2-pinnatifid, 1.5-3.0 cm long (including petioles), 4-5 primary lobes, generally 3-4-parted, the ultimate segments lanceolate, 2-3 mm long, 0.5-0.7 mm wide, mucronate, villous; petioles to 1 cm long, basally dilated, membranous. **Inflorescences** solitary, sessile in center of leaf rosettes. **Capitula** 3-4 mm high, 5-6 mm wide; phyllaries 2-seriate, ovate to oblong, ca. 3 mm long, 2.0-2.5 mm wide, densely villous, apically obtuse to rounded; marginal florets 20-30; disc florets 5-10, the corollas 1.2-1.4 mm long. **Achenes** 2.5-3.0 mm long, obovate, dorsally compressed, glabrous, the lateral wings terminating in divergent projections, the styles persistent, rigid, spinelike, to 1.5 mm long, the apex caducous.

This species was previously only known from the type locality in northwestern Argentina, some 2,000 km disjunct to the southeast of its locality in Peru. It is morphologically closest to *Soliva sessilis* Ruiz & Pavon (Chile) and *S. pterosperma*

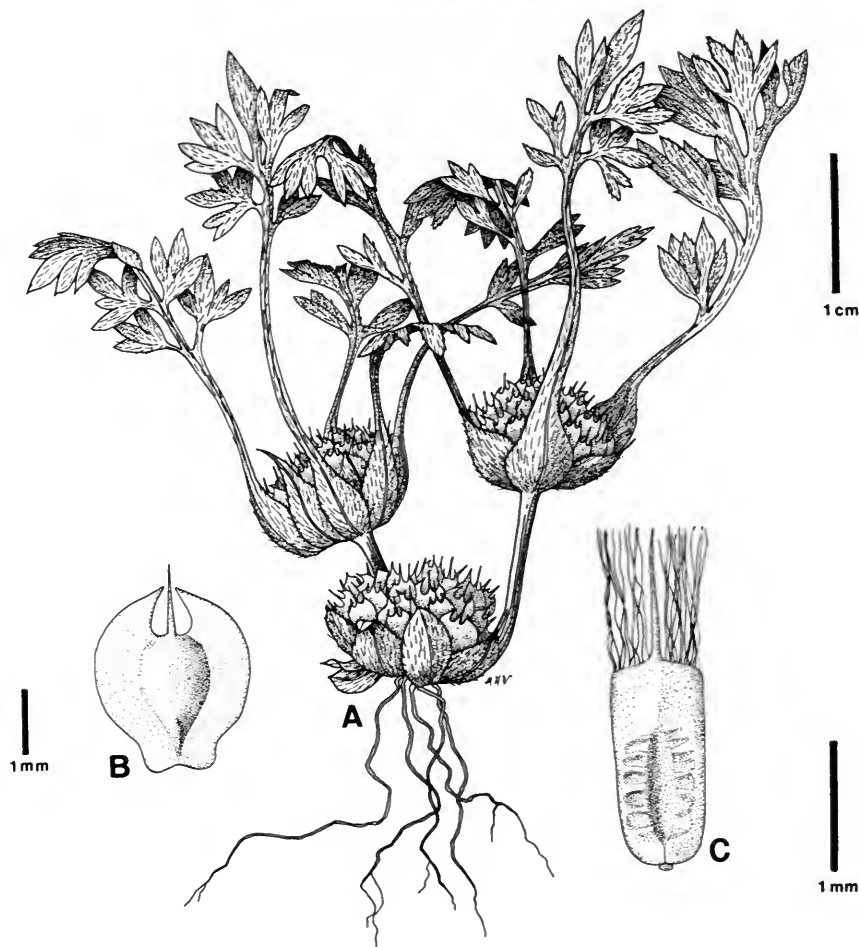


FIG. 3. *Soliva neglecta*. A, habit; B, achene; C, achene from *S. stolonifera*. (From Cerrate 2515, MO.)

(Juss.) Less. (Argentina, Uruguay, and Brasil), but it differs from these species in possessing glabrous achenes.

ANCASH. Bolognesi: Quero, al E de Huasta, 3,600 m, Cerrate 2515 (MO).

## 2. *Soliva stolonifera*<sup>5</sup> (Brot.) Loudon, Hort. Brit.: 364. 1830.

*Hippia stolonifera* Brot., Fl. Lusit. 1: 72. 1801. TYPE: Portugal, exact locality and collector unknown (LISU, holotype, not seen).

*Gymnostyles nasturtiifolia* Juss., Ann. Mus. Natl. Hist. Nat. 4: 262. 1804. TYPE: Argentina, Buenos Aires, Commerson s.n. (P-JU, holotype, not seen, IDC Microfiche 6206. 670: II. 6).

*Soliva nasturtiifolia* (Juss.) DC., Prodr. 6: 142. 1837.

<sup>5</sup>Other synonyms are listed by Cabrera (1949). Only the names listed have been used for Peruvian material.

Annual **herbs** to 5 cm tall; stems stoloniferous, glabrous. **Leaves** rosulate, oblanceolate-spatulate in outline, 1-2-pinnatifid, 2-4 cm long (including petioles), 3-5 primary lobes, entire or 1-3-lobed, the ultimate segments oblanceolate to elliptic, 1.5-5.0 mm long, 0.3-1.0 mm wide, mucronate, villous; petioles to 1 cm long, basally dilated, membranous. **Inflorescences** solitary, sessile in center of leaf rosettes. **Capitula** 2-3 mm high, 4-6 mm wide; phyllaries 2-seriate, lanceolate to oblong, 2-3 mm long, 0.5-1.0 mm wide, sparsely villous, apically obtuse to rounded; marginal florets 30-40; disc florets 6-10, the corollas 1.2-1.5 mm long. **Achenes** obconical, 1.5-2.5 mm long, dorsally compressed, the wings narrow, transversely rugose, terminating in two divergent, lateral projections, the styles persistent, rigid, spinelike, to 2 mm long.

This species is native to Uruguay and Argentina and has become naturalized in Europe, the Azores, the Canary Islands, and the United States. It is apparently rare in Peru, being represented by only one collection.

LIMA. Huarochiri: Río Blanco, *Macbride & Featherstone* 819 (F).

## XI. TANACETUM

**Tanacetum** L., Sp. Pl. 843. 1753. TYPE: *T. vulgare* L.

Annual or perennial **herbs**, sometimes scapiform, rarely suffruticose, often rhizomatous, aromatic; stems erect or ascending, usually leafy and branched, pubescent to glabrous. **Leaves** alternate, entire, toothed, pinnatifid or 1-3-pinnatisect. **Inflorescences** solitary or more often corymbose. **Capitula** radiate, heterogamous, rarely disciform, heterogamous, or discoid, homogamous; involucre hemispherical or campanulate; phyllaries 3-seriate, imbricate, lanceolate or oblong, often with scarious margins and apices; receptacles flat to convex, naked or with small, rudimentary paleae; marginal florets usually ligulate (rarely absent), uniseriate, usually pistillate, the ligules white, yellow, or pink; disc florets hermaphroditic, the corollas tubular, 5-lobed, yellow, the anthers basally obtuse, the terminal appendages elongate, obtuse, the styles basally enlarged, the branches apically truncate, penicillate. **Achenes** isomorphic, cylindrical or clavate, 3-10-ribbed, glabrous, often glandular; pappus a short corona, usually unevenly toothed or lobed, sometimes unilateral and developed on the posterior side.

A genus of about 70 species of annuals and herbaceous perennials, with centers of diversity in southwest Asia and the Caucasus, although various species are found throughout temperate regions of the northern hemisphere. In Peru, three introduced species are common escapes from cultivation.

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 HEYWOOD, V. H., AND C. J. HUMPHRIES. 1977. Anthemideae—Systematic review. In Heywood, V. H., et al. (eds.), *The Biology and Chemistry of the Compositae*, pp. 852-898. Academic Press, London.

## KEY TO SPECIES OF *Tanacetum*

1. Capitula disciform; all corollas yellow ..... 3. *T. vulgare*.
1. Capitula radiate; the ligules conspicuous, white; disc corollas yellow ..... 2.
2. Leaf segments narrowly lanceolate to oblong-lanceolate, densely silvery-sericeous; capitula solitary; involucre 10-15 mm in diameter ..... 1. *T. cinerariifolium*.
2. Leaf segments oblong to lanceolate, pubescent to subglabrous; capitula 5-30 in lax corymbs; involucre 9-11 mm in diameter ..... 2. *T. parthenium*.

1. **Tanacetum cinerariifolium** (Trev.) Sch. Bip., *Tanacet.* 58. 1844.

*Pyrethrum cinerariifolium* Trev., *Ind. Sem. Hort. Vratislav.* App. 2: 2. 1820. TYPE: not seen.

Perennial herbs to 50 cm tall, silvery-gray, sericeous. Basal leaves oblanceolate-spatulate, to 10 cm long (including petiole), pinnatifid to palmatifid, the segments narrowly lanceolate to oblong-lanceolate, glandular-punctate, sericeous; cauline leaves lanceolate to oblanceolate, entire to pinnatifid or palmatifid, 3–6 cm long; glandular-punctate, sericeous; petioles widely margined, 1–3 cm long. Inflorescences solitary; peduncles to 30 cm long, striate, sericeous, bracteate. Capitula radiate, heterogamous, 6–10 mm high, 10–15 mm wide (excluding rays); involucre hemispherical; phyllaries 3-seriate, imbricate, the outer ovate-lanceolate, 3–5 mm long, 1.0–1.5 mm wide, puberulent, the inner oblong to obovate, 5–6 mm long, 1.5–2.0 mm wide, the margins scarious, lacerate; receptacles convex, epaleate; ray florets 13–21, pistillate, the ligules oblong, 8–16 mm long, 2–4 mm wide, white; disc florets ca. 100, the corollas 2–3 mm long, 5-lobed, yellow. Achenes cylindrical, 2.5–3.5 mm long, curving inward, 5-ribbed, glandular; pappus an irregularly lobed corona, 0.7–1.0 mm high. Chromosome number:  $n = 9$ .

This species is native to western Yugoslavia and Albania and cultivated throughout southeastern and east-central Europe as an insecticide. In Peru, it is cultivated for its insecticidal properties and horticultural purposes. It is called "piretro."

JUNÍN. Huancayo: Huancayo, 3,317 m, *Soukup* 2933 (F). LIMA. Lima: La Molina, terreno cultivado, no collector, *USM # 11548* (MO).

2. **Tanacetum parthenium** (L.) Sch. Bip., *Tanacet.* 55. 1844.

*Matricaria parthenium* L., *Sp. Pl.* 890. 1753. TYPE: Europe, exact locality and collector unknown (BM, holotype, not seen).

*Chrysanthemum parthenium* (L.) Bernh., *Syst. Verz. Plf. Erfurt* 145. 1800.

Perennial herbs to 80 cm tall, aromatic; stems erect, densely leafy, prominently angled, puberulent to glabrate. Leaves ovate in outline, 3–12(–15) cm long (including petioles), 1–2-pinnatifid, the primary segments 3–5-paired, 0.7–3.5 cm long, 0.5–2.0 cm wide, usually 3–7-lobed, the margins dentate or pinnatifid, the ultimate segments oblong to lanceolate, obtuse to acute, mucronate, puberulent to glabrous, punctate-glandular beneath; petioles 0.5–3.5 cm long. Inflorescences laxly corymbose, 5–20(–30)-flowered; peduncles 3–8 cm long, puberulent, bracteate. Capitula radiate, heterogamous, 3–5 mm high, 9–11 mm wide (excluding rays); involucre hemispherical; phyllaries 3-seriate, imbricate, lanceolate, 2.0–3.5 mm long, 0.3–0.6 mm wide, keeled, stramineous, puberulent, glandular, the margins scarious, ciliolate; receptacles convex, sparsely paleaceous; paleae oblanceolate, ciliolate; ray florets 13–21, the ligules 4–6(–9) mm long, 2–4 mm wide, oval to oblong, 3-denticulate, white, the tube ca. 1 mm long, dorsiventrally compressed, enlarged near the base; disc florets 150–300, the corollas cylindrical, 1.5–2.0 mm long, 5-lobed, yellow. Achenes cylindrical, 1.0–1.6 mm long, curving inward, 5–8-ribbed, glandular; pappus absent or an irregularly lobed corona, 0.1–0.3 mm high. Chromosome number:  $n = 9$ .

This species is native to the Balkan peninsula and has long been cultivated for ornament and as a medicinal plant throughout Europe. It is a common introduction throughout the New World and often escapes from cultivation. Label datum indicates that it is used in Peru medicinally as follows (*Stork & Horton 10265*): "Infusion of leaves and stems, as well as flowers, applied externally to relieve stomach trouble." It is called "Santa Maria" in Latin America.

AMAZONAS. Bongara: Pomacochas, 2,200–2,300 m, *Ferreya* 15425 (MO); Chachapoyas: Chachapoyas, 2,700 m, *Williams* 7543 (F), 7550 (F). CUZCO. Anta: Santa Ana, El Chaccan, 3,511 m, *Brunel* 550 (F, MO); Cuzco: Picchu, cerca Cuzco, 3,440 m, *Brunel* 17 (F, MO). HUANCANELICA. Tayacaja: Salcabamba, 3,250 m,

*Stork & Horton 10265* (F). HUÁNUCO. Huanuco: Acomayo, 2,500 m, *Ridoutt s.n.* (MO). LA LIBERTAD. Otuzco: Hacienda San Ignacio, Sinsicap, 3,150 m, *Lopez 1122* (MO); Pataz: Huancaspata, 3,100 m, *Lopez & Sagastegui 8237* (MO). LIMA. Lima: Museo de Historia Natural, *Cornjejo s.n.* (MO). PASCO. Daniel Carrion: Yanahuanca, 3,048 m, *Macbride & Featherstone 1251* (F). PUNO. Huancane: Conima, 3,900 m, *Aguilar 428* (MO); Puno: Puno, *Soukup 468* (F); Sandia: Cuyocuyo, 3,500–3,600 m, *Ferreira 16612* (MO). SAN MARTÍN. Lamas: San Roque, 1,350–1,500 m, *Williams 7177* (F); San Martín: Tatapoto, 750 m, *Williams 5921* (F).

3. ***Tanacetum vulgare* L.**, Sp. Pl. 844. 1753. TYPE: Europe, exact locality and collector unknown (BM, holotype, not seen).

Perennial herbs to 1.5 m tall, aromatic; stems sparsely pubescent, glandular. Basal leaves oblanceolate-spatulate in outline, to 15 cm long (including petiole), 2-pinnatifid, the primary segments 7–10-paired, oblong to oblanceolate, 2–5 cm long, the ultimate segments oblong to lanceolate, serrate or irregularly toothed; petioles 3–5 cm long; cauline leaves ovate in outline, to 10 cm long, sessile, 2-pinnatifid, the primary segments 9–12-paired, oblong to oblanceolate, 2–5 cm long, the ultimate segments oblong to lanceolate, serrate or irregularly toothed, to 1 cm long, glabrous to sparsely pubescent. Inflorescences corymbose, 20–200-flowered. Capitula disciform, heterogamous, 4–5 mm high, 5–10 mm wide; involucre hemispherical; phyllaries 3-seriate, imbricate, the outer linear to lanceolate, 2.0–2.5 mm long, 0.6–1.2 mm wide, the inner ovate to oblong, 2.5–3.0 mm long, 1.0–1.5 mm wide, all with whitish, scarious margins; marginal florets 20–50, 1-seriate, pistillate, the corollas cylindrical, ca. 1.5 mm long, zygomorphic, yellow, apically 3-lobed, the middle lobe shorter; disc florets 200–300, the corollas cylindrical, 2–3 mm long, 5-lobed, yellow. Achenes cylindrical, 1.2–2.0 mm long, 5-ribbed, glandular; pappus an irregularly lobed corona, 0.1–0.3 mm high. Chromosome number:  $n = 9$ .

This species is native to Eurasia and is adventive throughout the New World. Although it has long been employed as an herbal remedy to rid the body of worms, it is uncertain if it is employed as such in Peru.

CUZCO. Anta: Llamaponga, El Chaccan, 3,580 m, *Brunel 104* (F, MO).

#### ACKNOWLEDGMENTS

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